HEEL ULCERS: SPECIAL CONSIDERATIONS FOR AMPUTATION PREVENTION

Nicole Byerley, DPM
Limb Preservation Services Fellow
Madigan Army Medical Center
DISCLOSURES

NICOLE BYERLEY

• No relevant financial relationship reported
INTRODUCTION

• Heel ulcers are common
• There are several etiologies that need to be considered and treated in a patient with a heel ulcer
• A high index of clinical suspicion of arterial involvement is necessary when evaluating heel ulcers
• Limb salvage rates for heel ulcers are much lower than any other foot ulcer
  • Likely due to underappreciation of the vascular component of the ulcer
• Requires reliable testing to determine presence and extent of vascular disease
• Vascular surgery, excellent wound care and possible surgical reconstruction are all important treatment options
ETIOLOGY

- Ultimately occur secondary to
  - 1) combined neuropathy and repetitive trauma
  - 2) immobilization with prolonged skin pressure
  - 3) direct trauma
  - 4) vascular disease
WHAT IS SO SPECIAL ABOUT HEEL ULCERS?

- Heel vasculature is unique
- Angiosomes
- More expensive to treat than other foot ulcers
- Less likely to heal as compared to other foot ulcers
- Often overlooked and incompletely treated

Yosuf MK, Mahadi SI, Mahmoud SM, et al., 2015
• Understanding the angiosome concept is critical in the evaluation and treatment of heel ulcers.

• 6 angiosomes exist in the foot and ankle:
  • Posterior tibial artery, anterior tibial artery or the peroneal artery
  • Posterior tibial artery and the perforating peroneal are the major heel vasculature contributors

• Several arterial-to-arterial connections to protect foot from ischemia if blood flow were to abruptly halt also known as choke vessels.

• HOWEVER - There are NO artery-to-artery connections between the posterior tibial arterial branches and the branches of the peroneal artery in the heel.

• DM especially causes multi-vessel distal disease, which overall can cause focal ischemia to the heel.

• Referred to as Orphan Heel Syndrome.

Clemens MW, Attinger CE., 2010
Taylor Z., 2013
EVALUATION OF HEEL ULCERS FOR AN ISCHEMIC COMPONENT

• Current methods used to evaluate tissue perfusion at the heel include:
  • **Ankle-Brachial Index**,  
  • **Toe Pressures**  
  • Skin perfusion pressure test (SPP)  
  • Forefoot pulse volume recordings (PVR)  
  • Transcutaneous oximetry (tcpo2)  
  • Fluorescence Angiography

• These tests are often limited by:
  • Medial calcinosis  
  • Scarring  
  • Previous amputations  
  • Ulcer location

Samies JH, et al., 2015
TREATMENT- PREVENTION

• Prevention!!!
  • Heel offloading devices
  • Foam dressings

Rooke Boot © 2017 Osborn Medical Corporation

Rajpaul, Kumal, and Claire Acton, 2016
Lyder, Courtney H., 2011
TREATMENT - VASCULAR SURGERY

- Revascularization is important in treating ischemic heel ulcers
- The concept of angiosome-guided revascularization is ideal and should be considered
  - Direct revascularization leads to increased rates of limb salvage and complete wound healing
  - Indirect revascularization is beneficial, if direct is not possible

Neville RF, Attinger CE, Bulan EJ, et al., 2009
Kabra A, Suresh KR, Vivekanand V, et al., 2013
Hinchliffe RJ, Brownrigg JRW, Apelqvist J, et al., 2016
FLUORESCENE ANGIOGRAPHY AND ITS USE IN ISCHEMIC HEEL ULCERS

• Provides assessment of real-time tissue perfusion and the healing potential for ulcers

• Considered minimally invasive, safe, easy to perform, easily accessible, and low cost

• Useful in identifying heel ischemia and documenting improved perfusion following revascularization and other treatments.

• Allows for early recognition of arterial insufficiency

Samies JH, et al., 2015
Igari, K, Kudo T, Toyofuku T, et al., 2013
ICG ANGIOGRAPHY-INITIAL
POST DEBRIDEMENT
• Prevention is key.
• The economic cost and morbidity of heel wounds is significant
• All patients presenting with a heel ulcer should be assessed for coexisting arterial insufficiency and other etiologies that contributed to its development
• Regional heel ischemia may occur due to the unique vasculature of the heel.
• Normal ABIs and a palpable pedal pulse does not rule out a localized ischemia and more sensitive testing, such as fluorescein angiography, has shown to be beneficial in evaluation and assessment of treatment regarding heel ulcers
• Heel ischemia identification and treatment lead to improved heel ulcer healing and a decreased amputation rate.


REFERENCES


• Lyder, Courtney H. "Preventing heel pressure ulcers: economic and legal implications." Nursing management 42.11 (2011): 16-19.